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ECONOMICS OF WATER USERS ASSOCIATIONS: THE CASE OF MAKTARAL REGION, SOUTHERN KAZAKHSTAN

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Introduction

This paper examines the economic viability of the proposed water user associations (WUAs) in the Maktaral Region of Southern Kazakhstan. It focuses on the issues of water costs from the viewpoint of the farmers and raises questions about some of the basic assumptions that underlie both the World Bank and Asian Development Bank (ADB) loan projects. By examining the issues faced by WUAs in one district this paper provides insight to the realities of irrigated agricultural development in the country. The final section provides recommendations for addressing the issues identified in the paper.

Agriculture plays an important role in Kazakhstan. In spite of the fact that agriculture's share of the GDP is only 11%, with over 40 percent of the population living in the rural areas, sustainable growth in this sector is key to stability in the country and the continued existence of the rural communities. All basic food items, including cereals, potatoes, vegetables, meat and dairy products are produced domestically. Furthermore, Kazakhstan continues to be a net exporter of grain (ADB, May 1998).

Given the arid conditions in most of the country, agriculture is dependent upon irrigation. Yet, in spite of the scarcity value of water, the use of irrigation systems has been very inefficient. Due to the low energy costs and zero-pricing of water, the original design of the systems did not place priority on system efficiency. It is estimated that irrigation systems in the country use 30-35% more water than irrigation systems growing similar crops in market oriented economies. In recent years irrigation system efficiency declined even further as most irrigation systems have deteriorated due to a lack of funds for maintenance and a breakdown in management.

Farm privatization and restructuring in the sector have created further problems. The rapidly increasing number of small farms has made irrigation management more complex involving financial, economic, environmental and institutional issues. State and district level water committees are facing increased difficulties in terms of water fee collection and revenue generation. The inefficient use of the irrigation systems has exacerbated local environmental problems with excessive water applications leading to water logging and soil salinity problems, as well as contributing to downstream environmental problems in the Aral and Caspian Seas.

Recognizing the basic requirement to address the need for drainage in the country, the World Bank and the Asian Development Banks have developed similar loan-supported projects in Maktaral, a cotton growing area in the southern part of Kazakhstan. The two projects propose to rehabilitate irrigation infrastructure in two areas (9,607 and 32,500 ha, respectively) and replace the vertical drains with new wells. These projects will support the Government's policy of privatization by facilitating the transfer of management of the irrigation and drainage systems (including the drainage wells) to the project beneficiaries who are to organize WUAs.

Because of the failure of the government to properly manage and maintain the irrigation and drainage systems, and the difficulties faced by the government to deliver water to the 1000's

of new water users in the area, it has become clear that new institutional mechanisms need to be adopted. In Maktaral. decentralized water management starting at the secondary canal diversions, utilizing WUAs, offers an institutional mechanism that can improve both water allocation efficiency as well as ensuring equity of distribution. Farmer based WUAs are seen as a management alternative that will guarantee sustainability of the irrigation systems by providing the necessary funding for O&M of the systems as well as ensuring transparency in the use of the water fees collected from the farmers.

1. Maktaral

Development of the Golodnaya steppe, covering approximately one million ha of which about 88% lies in Uzbekistan and 12% in Kazakstan, began as early as 1891. However, most of the irrigation systems in the Kazakhstan portion of the Golodnaya steppe, in Maktaral, were constructed during the 1950s and 1960s. Kazakhstan's portion of the Golodnaya steppe is 126,385 ha of which 125,881 ha can be irrigated by the Dostyk Main Canal. Administratively, the entire part of Kazakhstan's Golodnaya steppe is located in the Maktaral Raion (District).

In the Soviet economic system, most of Central Asia was assigned to be a provider of raw materials–primarily agricultural produce and minerals–to the industrial heartlands in the Slavic republics (Russia, Ukraine and Belarus). In order to increase the agricultural production in the region, from the 1940s on irrigated area expanded rapidly. Under the virgin lands campaign in the mid-1950s vast stretches of land in northern and central Kazakhstan were converted to agriculture. These were followed by the substantial expansion of irrigated area for cotton and rice production in Uzbekistan and southern Kazakhstan, including Maktaral.

Irrigation systems in Maktaral draw water from the Dostyk Canal, an unlined earth channel that diverts water from the Syr Darya at the Farkhadskaya Hydroelectric Complex located in Uzbekistan. The canal has a capacity at the head of 230 m3/second and is 113 km long–73 km in Uzbekistan and 40 km in Kazakhstan. It serves a total area of 226,000 ha – 102,000 ha in Uzbekistan and 124,000 ha in Kazakhstan–and is maintained by the Uzbekistan Government with the costs shared by the two countries. Most of the area served by the Dostyk Canal is drained by the Central Golodnaya steppe collector drain, which in the lower reaches also defines the border between Uzbekistan and Kazakhstan. The collector, which is also maintained by the Uzbekistan Government, drains into the Arnassi Depression in Uzbekistan.

The former State Water Resources Committee of the Cabinet of Ministers (now the State Water Resources Committee of the MoA) in June 1995 stated that the required volume of water for Kazakhstan's part of the Golodnaya steppe (an area of 126,300 ha) is 1286.2 million m3/year, or about 10,000 m3/ha/year. The system efficiency of the entire area is estimated at 0.64.

During the Soviet period, the Department of Irrigation Systems (UVS) delivered water from the Dostyk Canal to 31 large state farmers. These farms in turn operated their internal irrigation systems through internal irrigation brigades. As the irrigation system was only required to deliver water to large blocks of irrigated land, it did not contain a large number of control and diversion structures in the main and interfarm canals. With the breakup of the state farms and the establishment of an increasing number of smaller, private farms and cooperatives (now over 6,000), the lack of control structures is becoming more and more of a problem. These problems are further compounded by the fact that routine land leveling activities have been reduced and eliminated due to the financial conditions in the agricultural sector and deterioration of the majority of the agricultural machinery.

Topographic and hydrologic conditions in the Maktaral area require good drainage to

sustain irrigated agriculture. Yet, by the 1940s the region had started to experience water logging and salinity problems that were accelerated by the rapid expansion of irrigation in the 1950s and 1960s. To try to reduce the high watertables, the first horizontal open, gravity-flow drains were installed in the late 1950s and early 1960s. Their effectiveness was limited and they failed to solve the drainage problems. To supplement these drains, vertical drainage using centrifugal pumps was started in 1969.

These proved effective and over time the government installed in excess of 810 vertical drains in the Maktaral area. However, the majority of the drains were installed by late 1970 and have now exceeded their expected life. In addition, the situation was complicated by the withdrawal during the initial years of privatization of the subsidies that paid for the O&M of the wells, including payment of the electricity bills. With non-payment of the electricity charges, the State Electric Power Company cut all power supplies to the wells. This resulted in a complete collapse of the vertical drainage system during 1993-1994. As a consequence the water table rose rapidly and soil salinity led to a 40% decline in yields, back to pre-vertical drainage levels. At present none of the wells are functioning and in fact the power lines, transformers, switch boxes and electric motors have all been removed and sold for scrap--as a result the wells are totally non-functional.

2. Crop Production

Maktaral Raion has a comparative advantage in irrigated cotton. The district is contiguous to Uzbekistan, which is among the top three cotton exporters in the world. These areas are suited for cotton production because of their relatively long growing seasons, dry summer climate with high solar radiation, and perennial water supply from the Syr Darya via the Dostyk Canal.

In Maktaral, cotton, alfalfa and wheat are the dominant crops. Government agricultural scientists recommend a mix of 70%, 20% and 10% of the cultivated area, respectively, but during the past decade the cropping system has evolved into a mono-culture of cotton. Cotton is now produced on more than 100,000 ha and is by far the most significant crop in the area. Although it is grown on less than 1% of the area planted to grains in Kazakhstan, during recent years it is estimated that cotton has produced 10-15% of agricultural GDP, and 5-11% of the value of agricultural exports.

Present yields are far below potential, and those achieved during the 1970s and 1980s when the vertical wells were working. Yields are constrained by water logging and salinity as well as the lack of inputs, especially fertilizers and pesticides for the increasing pest problems in the cotton fields.

Table 1 Historical Cotton Yields at Selected State Farms in Maktaral (ton/ha)

Year	Nurlybaev (t/ha)	Zhana-Zhol (t/ha)	Zhenis Assoc. (t/ha)	Weighted Average Yield (t/ha)
1973	2.79	3.24		3.00
1974	3.00	3.84		3.39
1975	3.39	3.76		3.56
1976	3.26	4.17	2.20	3.58
1977	3.15	3.2	2.88	3.15
1978	2.82	3.78	2.48	3.21
1979	2.9	3.13	2.94	3.00
1973-1979 Avg.				3.27
1980	2.35	3.21`	3.22	2.78
1981	2.80	2.25	3.09	2.58
1982	1.70	2.25	1.75	1.94
1985	2.21	2.20	2.25	2.21

1986	3.12	3.09	2.97	3.10
1987	2.78	2.72	2.33	2.72
1988	2.22	2.70	2.50	2.45
1989	3.04	3.18	3.22	3.11
1990	2.94	3.20	3.21	3.04
1991	2.84	3.04	3.07	2.94
1992	2.39	2.51	2.17	2.40
1993	1.58	1.97	1.69	1.75
1994	1.89	2.49	2.31	2.17
1995	2.38	2.70	1.75	2.46
1996	2.01	2.16	0.56	1.88
Decline 17 yrs				-32.70%
Normalized 1996 yields				2.20

Source: Harza (August 1998)

Table 1 illustrates the changes in cotton yields in a selected set of state farms in the Maktaral area.

As can be seen in the table, yields have gone down since discontinuing the use of the vertical drains as well as due to the breakdown of the agricultural credit and agricultural input systems. In addition, average wheat yields have declined from 2.46 t/ha in 1990 to 1.59 t/ha in 1996 while alfalfa hay yields have slipped from 9.37 t/ha in 1990 to 7.27 t/ha in 1996. Yields of maize silage, vegetables and melons have also declined as result of the failure of the vertical drains and the resulting soil salinity.

3. Irrigation

Based on data reported by Harza (August 1998), the monthly watering rates for the main agricultural crops in the irrigated areas of Maktaral for 1994 and 1995 are presented in Table 2.

Table 2 Monthly Watering Rates of Main Agricultural Crops in Maktaral Raion (m3/ha)

Crop	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1994												
Cot.	36	36	315	577	1066	1310	1190	315		554	554	5953
Wht.	116	116	639	970	605	87	-	176	381	255	-	3229
Alf.	46	1063	655	939	1247	1432	1163	832	270	54	-	7701
1995												
Cot.	40	40	356	651	1207	1477	1342	356	-	624	624	6712
Wht.	-	75	414	628	392	57	-	115	247	165	-	2093
Alf.	34	792	488	700	930	1068	867	620	201	40	-	5740

Source: Harza (August 1998)

These totals can be compared to the crop water requirements for cotton (7799 m3/ha) and grains (6401 m3/ha) based on data from IBRD (January 1996). Obviously, the monthly watering rates in the region are less than those calculated by IBRD. This can be explained by the fact that although the Maktaral area is supposed to be provided around 10,000 m3/ha of irrigation water from the Dostyk canal, they often do not receive this amount. For example, in 1998, the Department of Irrigation Systems (UVS) reported that they delivered a total of 475,703,000 m3 of water. This served a total of 85,000 ha (out of the 126,000 potential ha of irrigated land), or an average of 5597 m3/ha.

Clearly, the amount of water delivered the last few years seems to be less than the crop water requirements which would indicate that the low yields are partly due to water stress. However, this is complicated by the fact that since the vertical drains have stopped working water table levels are very high in the area. These high water tables are forcing the farmers to delay planting (for example, much of the cotton is now being planted in May instead of April as the fields are too wet to work in March and April) as well as restricting the amount of water that can actually be applied without over-watering the roots of the plants. On the other hand, the high water tables actually result in sub-irrigation as water moves upward by capillary action to the plants. This significantly reduces the amount of water that needs to be applied via surface irrigation.

4. Crop Economics

As indicated, the major crops in Maktaral are cotton, wheat and alfalfa. Although the government recommends a mix of these crops with about 60% of the land in cotton, in reality the current agricultural economy is dominated by cotton with no more than 20% of the land in wheat and alfalfa. This reflects the relative profitability of the crops.

Production Costs

Over the past few years production costs in Maktaral have been increasing rapidly. This indicates the impacts of the privatization of the economy and consequent removal of subsidies. Table 3 indicates the historical costs of production for cotton and wheat in the Maktaral region for 1994-1996.

Table 3 Historical Costs of Agricultural Production ($/ha)

Crop	Unit	1994	1995	1996
Raw Cotton	US$/ha	202.20	469.50	607.38
Wheat	US$/ha	37.32	82.03	116.31

Source: Harza (August 1998)

These costs can be compared to the crop production costs quoted by the Asian Development Bank (ADB) and the World Bank for their Maktaral projects (Table 4)

Table 4 ADB and World Bank Crop Production Costs ($/ha)

Crop	Unit	ADB (1997)	World Bank (1997)
Raw Cotton	US$/ha	408.90	445.50
Wheat	US$/ha	292.60	355.40
Alfalfa	US$/ha	182.90	198.20

Note: These budgets assume farmers are hiring equipment
Source: ADB (November 1997) and Mott MacDonald/Temelsu (February 1998)

As can be seen, production costs for wheat (and alfalfa) have increased rapidly while production costs for cotton have actually fallen. This can probably be explained by the lack of credit and availability of inputs in the region and the consequent decline in input use (and yields) in the past two years. However, even though the costs for cotton production have declined they

still are significant and in general exceed the capacity of farmers to fund from their own resources. These costs are in line with the credit advances from the local cotton gins (around $400/ha) and also agree with those reported by farmers in the region. For example, one farmer detailed his direct production costs for cotton at $332.14/ha but admitted that he used less fertilizer and pesticides than previously due to lack of credit and availability of inputs–his yields were only 1.5 tons/ha of raw cotton which confirms the lower than normal levels of inputs.

Production Yields

Over the past five years, due to disruptions in the economic system, increases in water logging and salinity, unavailability of agricultural inputs and increases in pest problems, agricultural yields have declined for almost all of the crops in the Maktaral area. Historical data from three of the former state farms in the area illustrate the declines in production (Table 5).

Table 5 Historical Gross Crop Yields from Three State Farms in Maktaral (t/ha)

Crops	1990	1991	1992	1993	1994	1995	1996
Enterprise Nurlybaev							
cotton	2.94	2.84	2.39	1.58	1.89	2.38	2.01
wheat	2.28	2.37	2.57	1.90	1.88	1.70	1.20
alfalfa	9.32	7.26	6.94	9.79	9.66	7.41	10.69
Zhana-Zhol Ltd.							
cotton	3.20	3.04	2.51	1.97	2.49	2.70	2.16
wheat	2.65	2.19	3.82	2.70	2.97	2.56	1.97
alfalfa	9.85	7.41	6.62	7.05	6.93	9.82	4.74
Zhenya Association							
cotton	3.21	3.07	2.17	1.69	2.31	1.75	0.56
wheat	2.52	2.77	2.05	2.26	1.60	-	-
alfalfa	8.18	6.63	5.85	5.54	5.17	5.21	7.0

Source: Mott MacDonald/Temelsu (February, 1998)

The production figures from the three former state farms are reflected in data quoted by ADB and the World Bank. For example, the ADB (November 1997) quotes 1997 yields for cotton, wheat and alfalfa as 1.9 t/ha, 2.0 t/ha and 3.8 t/ha, respectively, while Mott MacDonald/Temelsu (February 1998) quotes 1997 yields for cotton, wheat, and alfalfa as 2.2 t/ha, 2.0 t/ha and 3.2 t/ha, respectively.

Crop Prices

Export prices for cotton in Maktaral are based on cotton prices in the Liverpool, England market. In contrast to most cotton growing areas, the low prices for cotton seed indicate that the local markets are not well established as there seems to be almost no demand for cotton seed oil and cotton seed cake in Maktaral. Without any public market outlets or farmer cooperatives, farmers must sell their cotton to the Kazakhstan Cotton Corporation or private cotton gins that are active in the Maktaral area.

Economic calculations by the ADB and World Bank were based on 1997 prices and, in the case of cotton, used Liverpool prices as the assumed price that farmers receive in Maktaral. The World Bank states, *There are now no formal controls on crop production and marketing in the South-Kazakhstan Oblast (State) and foreign buyers are actively buying cotton for export to Europe and elsewhere. No problems are envisaged in the marketing of the increased production at world market prices provided cotton lint of the required quality is provided. ..... No marketing problems are anticipated either for the other crops . Since the area as a whole is a wheat deficit area any incremental production is expected to find a ready market as an import substitute.....no problems are envisaged in the disposal (sale or farm use) of the small incremental production of alfalfa (Mott MacDonald/Temelsu, February 1998).* Prices used in the ADB and World Bank project appraisals are presented in Table 6.

Table 6 ADB and World Bank Project Appraisal Prices (US$)

Crops	Units	ADB	World Bank
Cotton Lint	(US$/ton)	$1705	$1305
Cotton Seed[1]	(US$/ton)	$504	$500
Wheat	(US$/ton)	$181	$175
Alfalfa	(US$/ton)	$136[2]	$40

[1]Liverpool c.i.f. price less transport and ginning costs and including value of raw seed
[2]Per fodder unit

Unfortunately, since the project was appraised cotton prices in Liverpool have slipped significantly. For example, 10 September 1998 cotton lint was $1477/ton and since then it has fallen to $1224/ton by 12 November 1998. However, this is not the major problem facing farmers. Due to the fact that almost no agricultural credit is available in the Maktaral area (the Agro-Credit banks are closed), farmers are forced to sell their cotton on future contracts to the cotton gins or the Kazakhstan Cotton Corporation.

During 1998 the Kazakhstan Cotton Corporation financed over 44,000 ha of cotton in the Maktaral area. In the process they advanced up to $400/ha for production credit (the farmers normally use the credit to buy seeds, fertilizers, fuel, pesticides and agricultural chemicals from the Corporation at prices established by the Corporation). The Kazakhstan Cotton Corporation has contracted with these growers to buy their cotton at Liverpool price less 35%. Given the

prices prevailing in November at harvest these ended up a price of less than $800/ton of lint ($795/ton on 10 November 1998).

With normal yields farmers still might at least breakeven at this price. However, on top of poor prices this year Maktaral has suffered from serious pest problems such that 40% of the crop has been destroyed. Combined with the increasing soil salinity problems, 1998 yields have been less than 2.0 t/ha of raw cotton or, with a conversion ratio of 32%, 0.64 t/ha of lint. As a result farmers have been unable to repay their production loans as their gross margin returns (gross returns minus cash inputs) were less than $100, before they paid taxes, water fees and VAT, as well as land payments if they were renting the land. Due to their inability to repay their loans, the Kazakhstan Cotton Corporation is charging their growers 10% additional interest to roll over their loans to next year as well as another 24% to obtain another production loan for next year. Under these circumstances farmers are unlikely to make any money on cotton during 1999 as well as during 1998.

The cotton gins are also operating in a similar fashion. For example one of the larger gins in Maktaral is providing production credit for 27,000 ha of cotton. They are purchasing the cotton from the farmers and after processing selling it to England and Switzerland. For cotton delivered in 1998 they paid the farmers $800/ton of lint with a maximum of $820/ton. Yet, these fields were attacked by pests and consequently had an average yields of 0.6 tons/ha of lint. These farmers were provided production loans by the cotton gin that they could use to buy production inputs at prices established by the gin. Due to pest damage and low yields the farmers did not make any money on cotton during 1998 and have found it difficult to pay off their loans.

These negative returns on cotton, which is by far the dominant production activity on cropped land in the Maktaral area, can be contrasted to the net returns projected by the World Bank (ranging from $544.5/ha in the first year to $1008.6 in years 5-30) and ADB ($849.20) in their appraisal documents. Admittedly, these returns were based on 1997 prices that were higher than those in 1998 but they still have to raise concerns about farmers' future ability to repay the loan.

Actual wheat prices in Maktaral during 1998 were also much lower than those used by the two banks. While the World Bank used a price of $175/ton and the ADB used a price of $181/ton actual prices paid to farmers in Maktaral ranged from $75-90/ton for wheat. Only alfalfa hay prices seemed to be in line with prices used during appraisal as local prices during 1998 were around $47/ton which compares with $40/ton used by the World Bank. However, due to water logging and salinity and the lack of inputs, such as fertilizers, yields were very low for these commodities, as well.

5. Water Costs

For farmers in Maktaral, irrigation water is life, but in contrast to the situation during the Soviet period it is becoming more expensive as they are forced to pay a larger percentage of the actual costs for irrigation service.

The Department of Irrigation Systems (UVS) charges the users of irrigation water on a volumetric basis for the water delivered to their farms. For 1998 the Department of Irrigation Systems (UVS) collected tenge (tg) 70,542,364 for delivering 475,703,000 m3 or about tg 148 for 1000 m3. With an average diversion of slightly more than 5,000 m3/ha water payments were about tg 800/ha or about $10/ha (at tg 80=1 US$). In theory, once responsibility for O&M of the secondary canal passes to the WUAs, the charge for water from the Department of Irrigation Systems (UVS) could decline. However, as the rate has been increasing steadily the past few years it is unlikely that it will actually decline. In fact, in its appraisal the ADB estimated an annual water charge from the Department of Irrigation Systems (UVS) of $23/ha.

Once the WUAs are formed it is their responsibility to raise the necessary funds to support their own internal operations. In different countries, annual costs for WUA operated irrigated systems range from $20-$150/ha. For example, Coello irrigation district in Colombia that was transferred to the WUA from the government has an annual water fee of $53.86/ha (Vermillion and Garces-Restreppo, 1996), while the Bayi Irrigation District in northern China charges the WUA members $41.50/ha (Johnson, et. al, 1995) and the Firebaugh Canal Irrigation District in California in the USA charges its members an average annual fee of $137.39/ha (Michelson, et al., 1997).

As part of its project work on the World Bank project in Maktaral, Mott MacDonald/Temelsu has estimated the annual water costs it will take to sustain the WUAs on two secondary canals in the region. These costs are detailed in Table 7. As can be seen in the table, annual O&M costs for the two WUAs are estimated to be around $50/ha, including electricity charges. The ADB project appraisal document estimated the cost at $54.90, including the electricity charges, while the World Bank appraisal was higher at $69.38/ha per year plus another $27.03/ha per year for electricity charges.

Under the World Bank project, after 5 years of grace the farmers are expected to repay 70% of the value of the loan (this is approximately equal to $926/ha) as well as interest at 8%. The government is still discussing various alternatives for repayment, but in general it is expected that this will require the farmers to pay approximately $80/ha per year for 25 years (after the five year grace period). The ADB project assumes that the beneficiaries will pay 73% of the project costs back over a 25 year period after a 5 year grace period at an annual interest rate of 8%. The project is still not clear exactly how and how much is to be collected but the project documentation estimates the annual cost of drainage and irrigation investment at $170.40/ha. Seventy-three percent of this is approximately $125/ha per year.

Another cost item, is for the actual purchase of the irrigation systems from the

government. This is an issue that has not been decided but if farmers are required to buy the irrigation system from the government (in contrast to signing a contract to operate and maintain the systems with ownership remaining with the government) it will further increase the costs of water to the farmers. In the case of the World Bank Maktaral project, if farmers on K-15 are required to buy the irrigation infrastructure it has been valued at 18 million tenge ($225,000) or $48.73/ha. It has been proposed that farmers would pay this over a three year period for an annual payment of $16.24/ha.

Table 7 Estimated Annual Budgets for WUAs on Canals K-15 and K-17

Item	K-17 WUA (US$)	K-15 WUA (US$)
Staff	21,240	20,640
Vehicle Operating Costs	16,000	16,000
Office Expenses	10,640	10,260
Electricity Charges	94,845	118,270
Replacement of Small Machines/Equipment	18,000	15,000
Routine Maintenance	13,830	12,205
Periodic Maintenance	74,740	54,930
Total	249,295	247,755
Area (ha)	4,990 ha	4,617 ha
Total (US$/ha)	$49.96	$53.66

Source: Mott MacDonald/Temelsu, October 1998

Finally, it has been proposed that all users of water should pay an environmental fee to reflect the benefits lost by diverting water from natural bodies and the impacts of return water on the environment. This charge, when implemented, will be around $25-35/ha for agricultural water. Adding all these charges, based on the lower rates approximate total per hectare water costs in Maktaral will be:

Costs	**Lower Estimates ($/ha)**
UVS water charges	$10.00
WUA O&M	$50.00
Loan Repayment Charges	$86.71
System Purchase	$16.24
Environmental Fee	$25.00
Total	$187.95

This water charge will decline by $16.24 after three years as the purchase of the irrigation

system is completed so will be $171.71/ha per year during the life of the loan, assuming the environmental fee is actually implemented, or $146.71/ha without the environmental fee. Given the present returns from crops, it is obvious that farmers will not be financially able to pay this amount, which leaves in doubt the farmers' ability to maintain a viable WUA as well as repay the loans.

6. Water Users Associations

The government recognizes that the relatively easy first phase of privatization is over. The challenge during the second phase is to establish viable farm enterprises. The second phase will require policy reform at the national level, and more importantly, the effective implementation of new policies at the state and district levels. The government's strategy must address the physical, technical and institutional constraints that are becoming increasingly apparent. These constraints include poor developments of the institutions required in an efficient market economy, run-down and often inappropriate infrastructure, farms that have been privatized but remain burdened by old management structures and the weak (and often non-existent) rural financial system. All of these problems plague the creation and development of strong WUAs in Kazakhstan.

In Maktaral, farmers are just starting to realize that establishing a WUA means, in effect, they are forming (and funding) a small irrigation department that will be assuming all the tasks previously completed by the irrigation brigades on the state farms. Registering as a legal entity, raising funds from the members, electing a democratically selected board of representatives, recruiting and training staff, renting an office, purchasing vehicles and equipment, establishing procedures for water allocation, planning annual maintenance programs, and reacting to conflicts and emergencies are just some of the activities that WUAs must face in order to provide reliable irrigation service to their members.

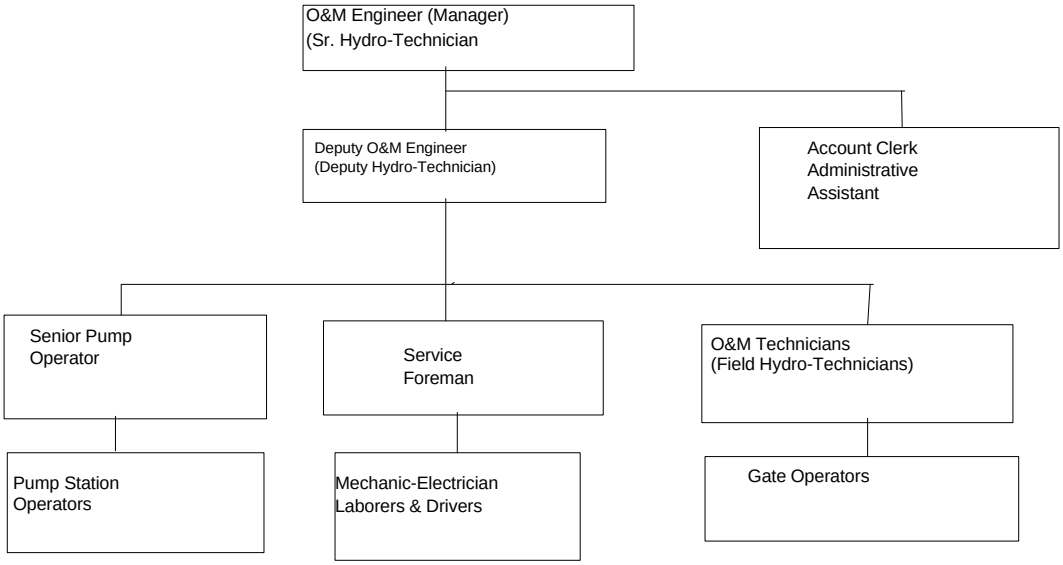
In order to operate and maintain their portion of the irrigation system as well as the drains (including vertical drains) and roads, the WUAs in Kazakhstan must recruit a professional staff. Figure 1 provides a suggested staffing pattern for the WUAs to be developed under the World Bank loan project. As can be seen, this pattern has a Senior and Deputy O&M Engineer along with office staff such as an account clerk and an administrative assistant. Below the O&M engineers are three groups; pump operators to operate the vertical drains, maintenance staff, and O&M technicians that operate the irrigation system. This is a standard staffing pattern for WUAs with the number of pump operators, mechanics and gate operators depending upon the size of the service area and number of irrigation structures that must be operated and maintained.

Recent experiences with the formation of WUAs in many countries have proven that farmers can carry out these activities and establish a viable WUA. This requires that the WUAs are established under legislation that protects their rights and also provides tax exemption for the WUA. Unfortunately, the present legal options for the formation of WUAs in Kazakhstan are laws established for commercial activities and hence have legal restrictions that discriminate against farmer organized groups that are non-profit, service oriented associations. In order to have sustainable WUAs the country will have to pass legislation that addresses the unique needs of farmer groups in general, and WUAs in particular.

It has been demonstrated in a number of countries that farmers will pay for irrigation O&M and are willing to take responsibility for their irrigation system. However, it is necessary that they are earning sufficient profits to afford the additional costs. In Mexican irrigation

systems where farmers wereearning good money, the WUAs expanded rapidly and are now very strong. In contrast in irrigation districts were farmers were facing financial difficulties, the WUAs also faced difficulties becoming strong and viable (Johnson, 1997). Cases such as this have occurred in WUAs in Colombia, Sri Lanka and Indonesia. Clearly, for WUAs to be effective and sustainable in Kazakhstan, the farmers have to be able to earn a reasonable living from their farm income.

Figure 1 WUA Organization Chart



7. Future Issues and Recommendations

A particular problem for the farmers in Maktaral, where cotton is the dominant crop, is the lack of available agricultural credit. With extremely limited financial resources on the farm, the result is that farmers are using fertilizers and pesticides at levels far below recommendations, and in many cases below threshold levels. There is also no medium-term credit for purchase of farm machinery and equipment and as a consequence there has been no replacement of the old and worn out farm machinery during the past few years.

As a result of the lack of access to credit to buy inputs, farmers are forced to sell their crops on forward contracts which guarantees they will receive a below market price for their produce and pay above market prices for their inputs. Under these circumstances, members of the WUAs are caught in a vicious circle. This is compounded further by the drainage and soil salinity problems they face in the region. Without drainage the farmers in the WUA face an increasingly hostile growing environment. Yet, with drainage but without agricultural credit and access to the proper agricultural chemicals and fertilizers, they cannot take advantage of the benefits of drainage.

The two loan projects by the World bank and the ADB are designed to improve the technical infrastructure of the irrigation system and address the drainage problem by reinstalling vertical drains. However, as stated in the loan documents, while recognizing the acute agricultural credit problems faced by farmers, the loans do not attempt to address this problem but assume that farmers can provide credit from their own resources. Unfortunately, (after a five year grace period) by requiring loan repayment (70%and 73%, respectively), the loans will actually exacerbate liquidity problems faced by farmers.

Cotton is the main cash crop in the area and cotton, whether it is produced in Kazakhstan or California, requires production credit. Therefore, in order for the WUAs to be strong and for the farmers to be able to support them as well as repay the bank loans, the government in conjunction with the private sector banks has to re-institute a viable system of agricultural credit with reasonable interest rates. This will allow the farmers to escape the grip of the cotton gins and the Kazakhstan Cotton Corporation and earn a reasonable return on their crops.

The second major issue in the region is drainage. Vertical drains work and have proven to be effective in the region, but this was under circumstances when the government paid for the installation of the wells as well as for the energy to operate them, and staff to maintain them. Drainage in Maktaral is a necessary (but not sufficient) condition for productive and sustainable agriculture.

Drainage systems cannot serve just one farmer. In order to work effectively they must be installed so that they will benefit the entire region. These benefits are shared not just by the farmers but also by the merchants, cotton gins, cotton pickers, exporters and the government. Therefore, there is an argument that the costs of drainage should be spread across a wider spectrum than just the farmers. One approach would be to establish a drainage assessment

district and all land in the region, including land that is used for other economic activities, would have to pay a drainage fee to keep the drainage system functioning. This type of assessment district is often found in the US as it recognizes that the other economic activities in the region are equally dependent upon the drainage system continuing to function in order for the local economy to be viable.

A third problem facing the region is that of agricultural pests, particularly those attacking the cotton crop. With a breakdown in the agricultural extension system, lack of credit and access to effective pesticides and a gradual shift toward a mono-culture of cotton, pest problems have increased dramatically. This year in excess of 40% of the cotton crop was eaten by bugs. Farmers that are able to obtain and apply viable pesticides are penalized as the fields of their neighbors that are not properly treated serve as a breeding ground and once the bugs have consumed their neighbors' crops they then attack the treated fields.

To address this problem, it is necessary to use an integrated approach. This means that the Maktaral region has to use survey teams to identify areas where pests have reached a critical level and to spray on a systematic basis where needed and when needed. The region also needs to enforce planting dates and plow down dates to break pest cycles. And finally, the region needs to reintroduce an extensive crop breeding program to develop new varieties that have pest resistance as well as higher yield potential. This is particularly important in Maktaral as the varieties currently being used are quite old and over time have lost some of their vigor and resistance. Strong WUAs that work together can take the lead in these activities, but they need technical assistance from specialists in crop breeding and protection.

Finally, if WUAs are going to be responsible for O&M in Maktaral, it is important that the WUAs be formed and legally registered under a legal statute that is designed for farmer member organizations. This statute must recognize that a WUA is formed by a group of farmers to provide services to the members of the WUA. It is not a profit-making association and therefore should not be expected to pay taxes on the services it provides to its members. Every entity (whether legal or physical, a joint stock company, a partnership or a producers cooperative) that receives water from the WUA should have the right to be a member with equal rights and responsibilities. The farmers are the owners of the WUA and they are the ones that should democratically elect their representatives that establish the policies under which the association is governed. Registration as a WUA needs to be a simple and straight-forward process and should not be expensive nor time consuming.

In order to have a sustainable WUA, it is imperative that the associations have access to training courses to learn how to carry out their functions. Not only do the hired staff of the WUA need access to training courses on irrigation system and drainage operation and maintenance, the members of farmer-elected Board of Representatives also need training courses in organizational and financial management. Democracy and transparency in an organization is new in Kazakhstan and training is critical in developing an understanding of the role of a farmer controlled organization and how the association can function to serve the needs of all the farmers in the association. Given that the Board of Representatives as well as the other elected members will change over time, it is important that in-service type training be available on a continuing basis. This can be provided by a local educational institute, a NGO, or a government agency.

However, no matter which group provides training, to keep the WUAs sustainable, training must be affordable and accessible for the elected members of the WUAs.

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